CAS-161A

Code Activated Switch

User's Guide

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1.   Introduction

The CAS-161A Code Activated Switch enables a single RS232 Control port to switch between 16 to 64 ports via an ASCII code sequence.

The code sequence is a user-selectable Prefix code and a Port Select code. The Prefix code is set via the Setup switch on the bottom of the unit. For added security, the Setup switch can be set to require one, two, four or eight of the same Prefix codes. The Port Select code selects the desired port and allows data to pass between it and the Control port until the next Prefix/Port Select code is detected.

The CAS-161A also features a Broadcast mode which enables the Control port to transmit to all ports.

Optional RS422 line drivers can be factory installed to increase data transmission up to one mile.

The CAS-161A is field-expandable to 32, 48 or 64 ports by attaching up to three additional Add-On Modules to the master unit. CAS-161A applications include:

- Industrial Robotic and Numeric Control
- Remote Diagnostics
- Quality Control for Test Environment
- Laboratory Equipment Polling
- Electronic Rotary Switch Selection for Data Gathering
- Data Acquisition

Typographic Conventions

Throughout this User's Guide, typefaces and characters have been used to denote the following:

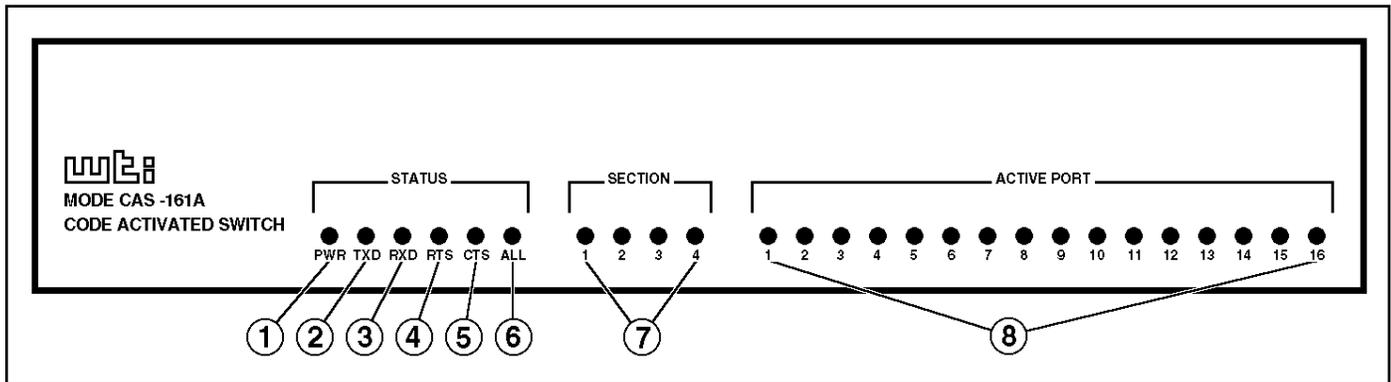|	
[Key]	Text set in bold face and enclosed in square brackets indicates a specific key. For example **[Enter]** or **[Esc]**.
^ (e.g. **^V**)	Indicates a key combination used to invoke a command. For example, the text "**^V**" (Control V) indicates the **[Ctrl]** key and the **[V]** key must be pressed simultaneously.
COURIER FONT	Indicates characters typed on the keyboard. For example **^Yk** or **^V**

2.   Unit Description

Figure 2.1: Instrument Front Panel

2.1. Front Panel Indicators

① **PWR:** (Power) Indicates power to the unit is ON.

② **TXD:** (Transmit Data) Indicates data is being transmitted out pin 2 of the Control port (MODEM Port). Indicates data is being received at pin 2 of the selected port.

③ **RXD:** (Receive Data) Indicates data is being received at pin 3 of the Control port.

④ **RTS:** (Request to Send) Indicates high RS232 signal at pin 4 (output) of the Control port. Indicates high signal at pin 4 (input) of the selected port.

⑤ **CTS:** (Clear to Send) Indicates a high RS232 signal   received at pin 5 (input) of the Control port.

⑥ **ALL:** Indicates Broadcast Mode is active, all ports open.

⑦ **SECTION Indicators:** When optional Add-On Module(s) are present, indicators show port connections on master or Add-On Modules as follows:

• **Section 1:** Ports 1 - 16 selected on master unit.

• **Section 2:** If second Module is present, indicates Ports 17 - 32 selected.

• **Section 3:** If third Module is present, indicates Ports 33 - 48 selected.

• **Section 4:** If fourth Module is present, indicates Ports 49 - 64 selected.

Example: If Section 4 LED and Active Port 2 LED are lit, this indicates port 50 is selected (2 + 48 = 50).

⑥ **ACTIVE PORT Indicators:** These indicators are used with the previously mentioned SECTION LEDs to indicate the port currently connected to the Control port.
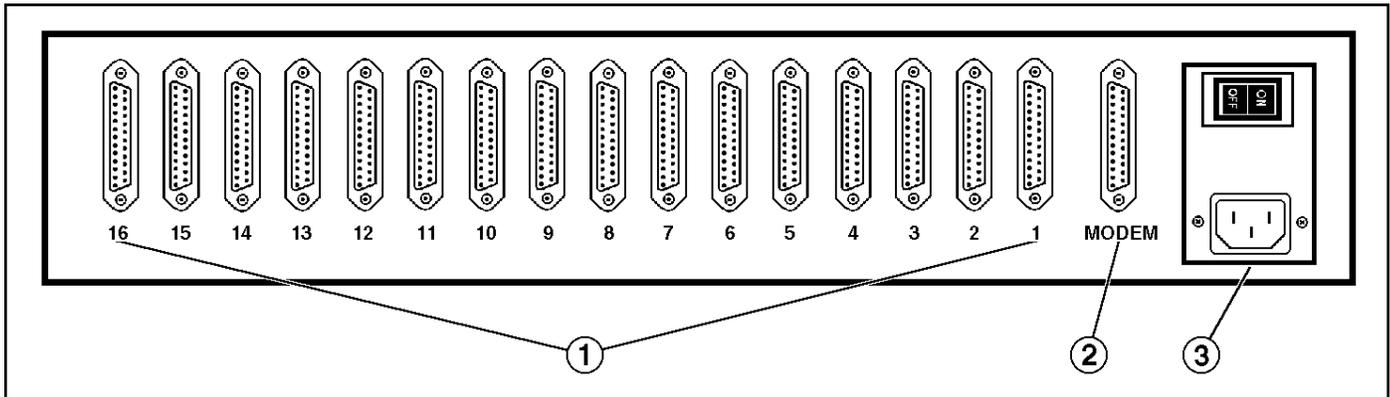
Figure 2.2: Instrument Back Panel

2.2. Back Panel Components

① **Input Ports 1 - 16:** Ports labeled 1 - 16 are 25-pin, female, RS232 connectors. Optional RS422 connectors can be factory installed to increase data transmission distance. For a description of the port interface, please refer to Appendix A.

② **MODEM Port (Control Port):** A 25-pin, female, RS232 connector. For a description of the port interface, please refer to Appendix A.

③ **AC Power:** Power connector and ON/OFF switch. The unit can be jumper-selected for either 115 or 230 VAC.

④ **SetUp Switches:** (Not Shown) Two banks of DIP switches located on the underside of the unit. The SetUp Switches are used to configure the prefix code, select baud rates and parity, and set other features as described in Section 3.

3. Installation

3.1. Configure SetUp Switches

There are two banks of DIP switches located on the bottom of the CAS-161A unit. These switches are used to configure the Prefix Code (command character), enable the Broadcast Mode, and select the baud rate. Switch functions are summarized on the bottom of the unit and in the sections that follow:

> **Note:** Switch positions "1" and "0" are indicated on the bottom of the unit.

3.1.1. SetUp Switch Bank 1

The bank of switches located closest to the rear panel are used to select the Prefix Code Repetition Value, Broadcast Mode, and baud rate.

3.1.1.1. Prefix Code Repetition Value (Sw1 - Sw4)

The Prefix Code informs the unit that the next character will be a command. In order to allow the unit to adapt to a variety of applications, it is often useful to require that the Prefix Code be repeated several times in order to be recognized. For example if the Prefix Code is **^V** and the Repetition Value is 4, then the sequence "**^V^V^V^V**" would be sent prior to a port selection command.

> **Note:** When transmitting binary data, it is recommended that the Repetition Value be set at four or eight. This will decrease the possibility of random characters in data being misinterpreted as commands.

Prefix Code Repetition	Switch (Bank 1)			
	1	2	3	4
1 x Prefix Code *	1	0	0	0
2 x Prefix Code	0	1	0	0
4 x Prefix Code	0	0	1	0
8 x Prefix Code	0	0	0	1

* = Factory Setting

3.1.1.2. Broadcast Mode (Sw5)

On (1) forces all ports open. Data from the Control (MODEM) port is sent to all Input ports. Useful for broadcasting to or controlling all Input devices. When enabled, concurrent data sent by Input ports to the Control port will be jumbled together.

Broadcast Mode	Sw5
Disable*	0
Enable	1

* = Factory Setting

3.1.1.3. Baud Rate Select (Sw6 - Sw8)

Selects the operating baud rate; from 150 to 19.2K baud.

Baud Rate	Switch (Bank 1)		
	6	7	8
19200	0	0	0
9600*	1	0	0
4800	0	1	0
2400	1	1	0
1200	0	0	1
600	1	0	1
300	0	1	1
150	1	1	1

* = Factory Setting

3.1.2. SetUp Switch Bank 2

The bank of DIP switches located closest to the front panel are used to select the Prefix Code character and set the parity.

3.1.2.1. Prefix Code (Sw1 - Sw7)

As mentioned previously, the Prefix Code informs the unit that the next character will be a command. The Prefix code can be any ASCII character. However, since it is passed on to the connected device, it is recommended to use a non-printable character. The factory default is ^V (Control V). Please refer to the following table when selecting a Prefix Code.

Prefix Code (Name)		Switch (Bank 2)						
		1	2	3	4	5	6	7
^@	(NUL)	ON	ON	ON	ON	ON	ON	ON
^A	(SOH)	OFF	ON	ON	ON	ON	ON	ON
^B	(STX)	ON	OFF	ON	ON	ON	ON	ON
^C	(ETX)	OFF	OFF	ON	ON	ON	ON	ON
^D	(EOT)	ON	ON	OFF	ON	ON	ON	ON
^E	(ENQ)	OFF	ON	OFF	ON	ON	ON	ON
^F	(ACK)	ON	OFF	OFF	ON	ON	ON	ON
^G	(BEL)	OFF	OFF	OFF	ON	ON	ON	ON
^H	(BS)	ON	ON	ON	OFF	ON	ON	ON
^I	(UL)	OFF	ON	ON	OFF	ON	ON	ON
^J	(LF)	ON	OFF	ON	OFF	ON	ON	ON
^K	(VT)	OFF	OFF	ON	OFF	ON	ON	ON
^L	(FF)	ON	ON	OFF	OFF	ON	ON	ON
^M	(CR)	OFF	ON	OFF	OFF	ON	ON	ON
^N	(SO)	ON	OFF	OFF	OFF	ON	ON	ON
^O	(SI)	OFF	OFF	OFF	OFF	ON	ON	ON
^P	(DLE)	ON	ON	ON	ON	OFF	ON	ON
^Q	(DC1)	OFF	ON	ON	ON	OFF	ON	ON
^R	(DC2)	ON	OFF	ON	ON	OFF	ON	ON
^S	(DC3)	OFF	OFF	ON	ON	OFF	ON	ON
^T	(DC4)	ON	ON	OFF	ON	OFF	ON	ON
^U	(NAK)	OFF	ON	OFF	ON	OFF	ON	ON
^V	(SYN)	ON	OFF	OFF	ON	OFF	ON	ON
^W	(ETB)	OFF	OFF	OFF	ON	OFF	ON	ON
^X	(CAN)	ON	ON	ON	OFF	OFF	ON	ON
^Y	(EM)	OFF	ON	ON	OFF	OFF	ON	ON
^Z	(SUB)	ON	OFF	ON	OFF	OFF	ON	ON
^[	(ESC)	OFF	OFF	ON	OFF	OFF	ON	ON
^\	(FS)	ON	ON	OFF	OFF	OFF	ON	ON
^]	(GS)	OFF	ON	OFF	OFF	OFF	ON	ON
^^	(RS)	ON	OFF	OFF	OFF	OFF	ON	ON
^_	(US)	OFF	OFF	OFF	OFF	OFF	ON	ON

Factory Setting = **^V**

3.1.2.2. Parity (Sw8)

Parity can be set to Even, Mark, Odd, None, or Space.

Parity	Switch 8 (Bank 2)	
	1 (On)	0 (Off)
Even, Mark		X
Odd, None, Space	X	

3.2. Connect Power Cable

1. Make certain the power switch is in the OFF position.

2. Attach one end of the power cable to the AC power connector on the CAS-161A. Attach the other end to a grounded wall outlet.

3.3. Connect Data Cables

Note: Check to make certain all data cables are compatible. Refer to the Appendix for a description of the interface.

1. Make certain the power switch is OFF.

2. Connect the data cables from the devices to be controlled to the ports labeled 1 - 16 on the master unit.

    If your installation includes optional CAS-161A Add-On Modules, install the additional Modules as described in Appendix C, and then connect ports 17 - 64.

3. Connect the cable from your control device (PC, modem, etc.) to the MODEM connector on the CAS-161A.

4. Port Selection

4.1. Selecting a Port

1. After completing the installation procedure, flip the power switch on the back of the unit to ON.

    Note: Upon each power-up the unit will reset and all ports will be closed.

2. Refer to the Port Select Code Chart below and find the letter representing the port you wish to connect to.

Module 1		Module 2		Module 3		Module 4	
Port	**Code**	**Port**	**Code**	**Port**	**Code**	**Port**	**Code**
1	@	17	P	33	`	49	p
2	A	18	Q	34	a	50	q
3	B	19	R	35	b	51	r
4	C	20	S	36	c	52	s
5	D	21	T	37	d	53	t
6	E	22	U	38	e	54	u
7	F	23	V	39	f	55	v
8	G	24	W	40	g	56	w
9	H	25	X	41	h	57	x
10	I	26	Y	42	i	58	y
11	J	27	Z	43	j	59	z
12	K	28	[	44	k	60	{
13	L	29	\	45	l	61	:
14	M	30	]	46	m	62	}
15	N	31	^	47	n	63	~
16	O	32	_	48	o	64	DEL

3. Go to the PC or terminal connected to the Control (Modem) Port. Start your communications program. Enter the Prefix Code followed by the appropriate Port Select Code.

    The Control port connects to the selected port and remains connected until another code sequence is issued.

Note:
- The Prefix code is sent out the selected port. The Port Select code is not sent out the selected port because all ports close briefly upon receipt of the Prefix code.
- The selected port opens during the Port Select code's stop bit time. All data following the Port Select code is sent out the selected port including the next Prefix code.

Examples:

Assume the Prefix Code is ^V and the Prefix Code Repetition Value is 4. To connect to Port 14, use the following command:

^V^V^V^VM

Assume the Prefix Code is ^Y and the Prefix Code Repetition Value is 1. To connect to Port 44, use the following command:

^Yk

4.2. Closing/Opening All Ports

1. To close all ports at once, enter the Prefix code, followed by a space.

2. To open all ports at once, enter the Prefix code, followed by ^X (Control X) (CAN)

Example: Assume the Prefix Code is ^V and the Prefix Code Repetition Value is 2. To open all ports at once, use the following command:

^V^V^X

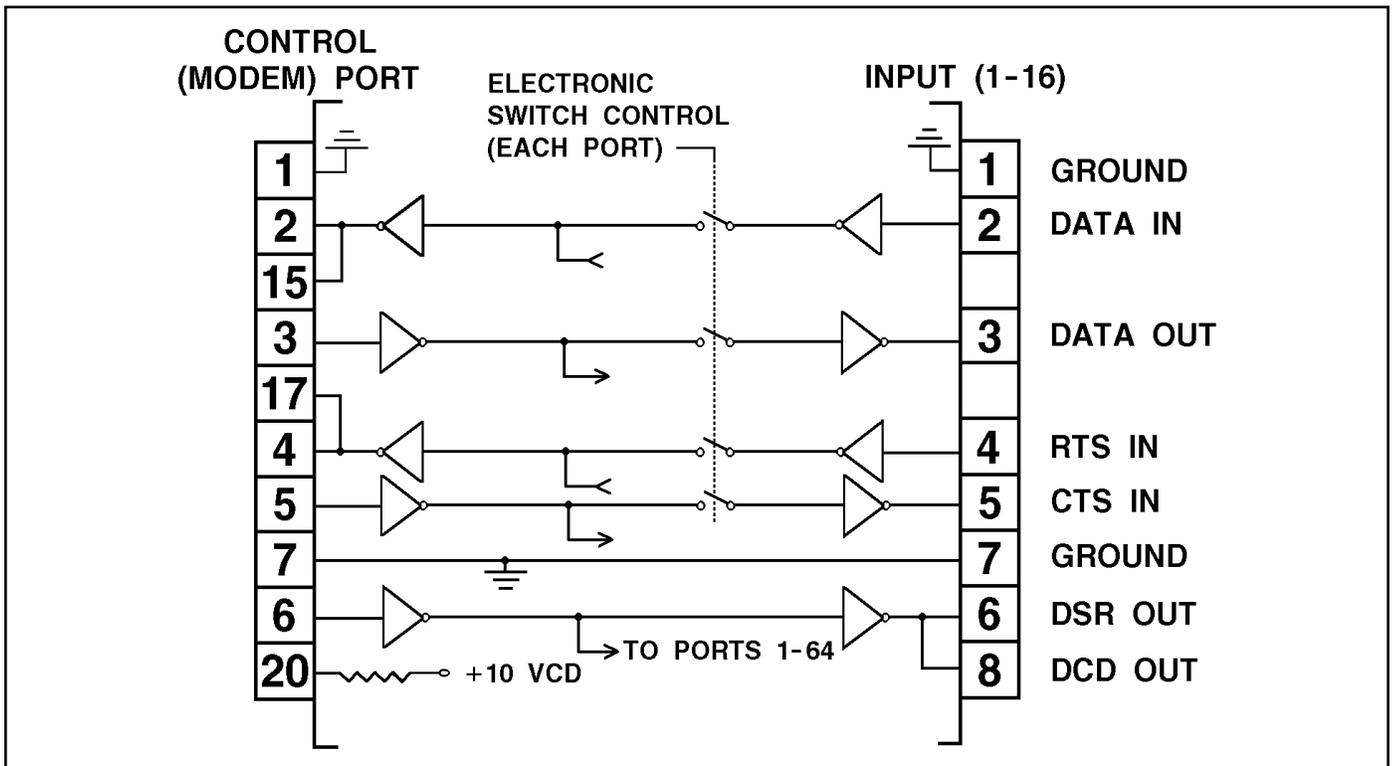# A. Interface Description

A.1. RS232 Ports (Standard)

Figure A.1: RS232 Interface

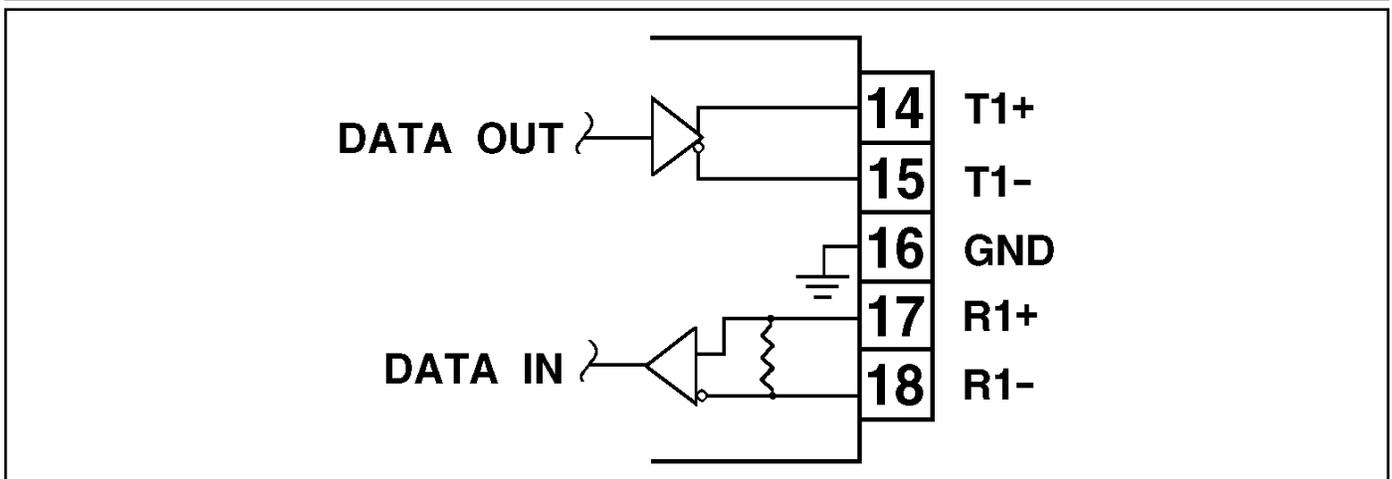## A.2. RS422 Ports (Optional)

Figure A.2: RS422 Interface

Note: Handshake signals are not passed. Pins 1 - 13 are open.

B. Printable Prefix Codes

Since the Prefix code is transmitted through the opened port, it is best to select a non-printable Prefix Code. The procedure for selecting the Prefix Code is described in Section 3. If your application requires a printable code, refer to the ASCII code chart below. Remember:

- Switch positions 1 - 7 correspond to ASC bits B1 - B7 on the chart.
- Switch positions should be ON for a 0 and OFF for a 1.

Example: To select the "@" character for a printable Prefix code: B1 - B7 on the chart shows 0 0 0 0 0 1 for "@". Therefore, Sw1 - Sw6 should be ON and Sw7 OFF.

B7 →						0	0	0	0	1	1	1	1
B6 →						0	0	1	1	0	0	1	1
B5 →						0	1	0	1	0	1	0	1
↑Bits →	b4 ↓	b3 ↓	b2 ↓	b1 ↓	Col→ Row ↓	0	1	2	3	4	5	6	7
	0	0	0	0	0	NUL	DLE	SP	0	@	P	`	p
	0	0	0	1	1	SOH	DC1	!	1	A	Q	a	q
	0	0	1	0	2	STX	DC2	"	2	B	R	b	r
	0	0	1	1	3	ETX	DC3	#	3	C	S	c	s
	0	1	0	0	4	EOT	DC4	$	4	D	T	d	t
	0	1	0	1	5	ENQ	NAK	%	5	E	U	e	u
	0	1	1	0	6	ACK	SYN	&	6	F	V	f	v
	0	1	1	1	7	BEL	ETB	'	7	G	W	g	w
	1	0	0	0	8	BS	CAN	(	8	H	X	h	x
	1	0	0	1	9	HT	EM	)	9	I	Y	i	y
	1	0	1	0	10	LF	SUB	*	:	J	Z	j	z
	1	0	1	1	11	VT	EXC	+	;	K	[	k	{
	1	1	0	0	12	FF	FS	,	<	L	\	l	|
	1	1	0	1	13	CR	GS	-	=	M	]	m	}
	1	1	1	0	14	SO	RS	.	>	N	^	n	~
	1	1	1	1	15	SI	US	/	?	O	_	o	DEL

C. Installing Add-On Modules

The CAS-161A is field expandable to 32, 48, or 64 ports by attaching up to three additional Add-On Modules to the master unit. Each Add-On Module Kit includes the following:

- 1 ea. Add-On Module w/ six-wire power cable
- 2 ea. Connecting Plates
- 1 ea. Left Rack-Mount Bracket (Style-2)
- 1 ea. Right Rack-Mount Bracket (Style-2)
- 18 ea. 6-32 x 3/8" Screws

To install Add-On Modules, refer to Figure C.1 below and proceed as follows:

> **Note:** If your unit has a stand-alone top cover, a Style-1 Rack-Mount Kit is also required for the top Module.
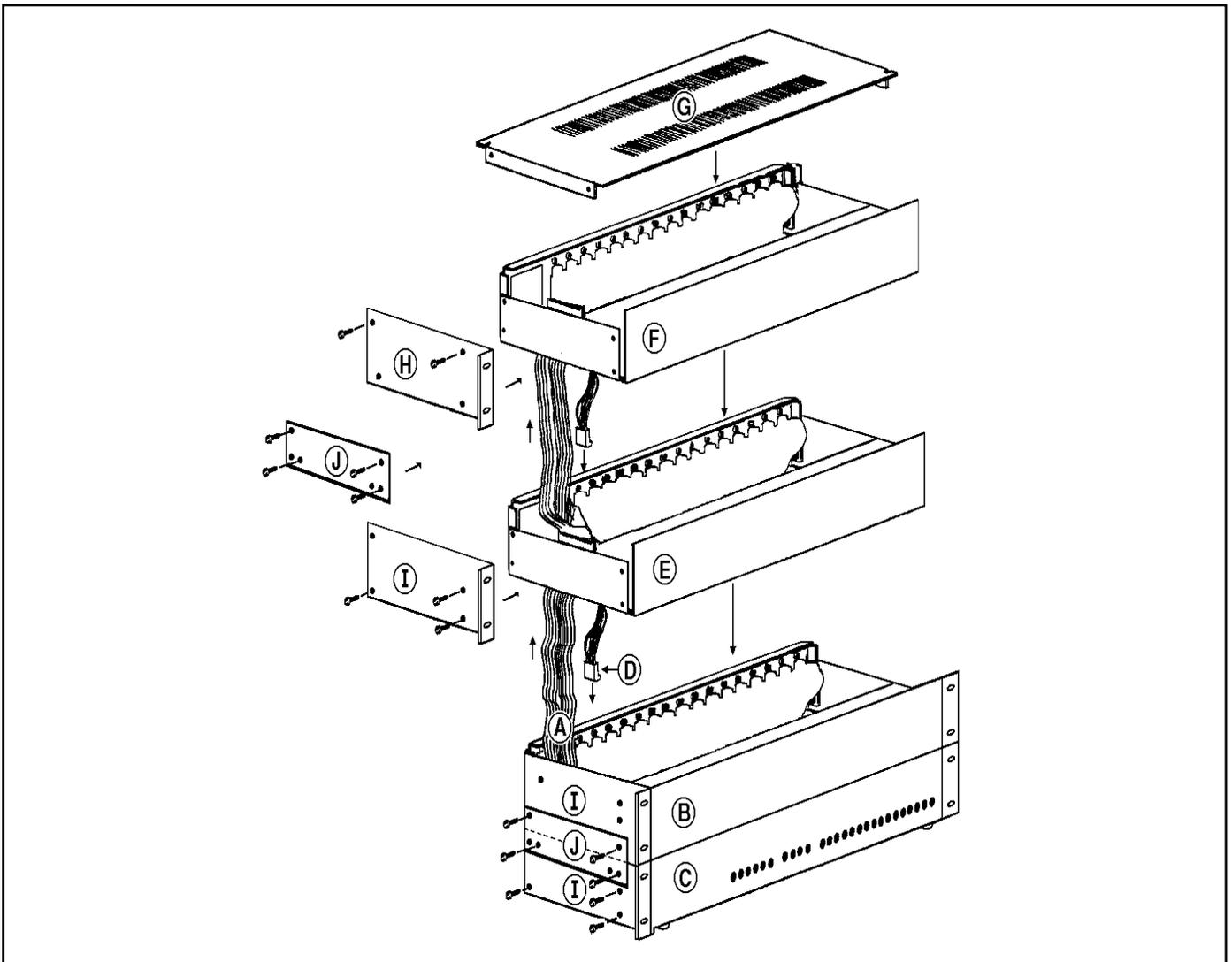

Figure C.1: Add-On Module Installation

1. Remove the instrument top cover. If your unit has a stand-alone top cover, remove the cover; the stand-alone cover is no longer required. If your unit has a Rack-Mount Kit, remove the Rack-Mount Cover, Left and Right Rack-Mount Brackets (Style 1), and screws. Save these parts, they will be used later.

2. Locate and unroll the ribbon cable (A) from inside the Master Unit. Hold the Add-On Module (B) over the Master Unit (C). Feed the ribbon cable up through the bottom of the Add-On Module. Plug the ribbon cable's first connector into the Add-On Module's P2 connector.

3. Plug the Add-On Module's six-wire power cable at P1A (D) into the Master Unit's P1B (Power Out) receptacle. Set the Add-On Module in place. Locate the Sw3 DIP switch *inside* the Add-On Module. Refer to the table below, and change switches to match the Add-On Module.

Add-On Module	Ports	Sw3			
		1	2	3	4
Section 2	17 - 32	On	On	Off	Off
Section 3	33 - 48	On	Off	On	Off
Section 4	49 - 64	On	Off	Off	On

4. Repeat Step 3 to install any additional Add-On Modules (E and F). Refer to the table above and make the appropriate DIP switch changes to match each Module/Section.

5. Install the Rack-Mount Top Cover (G) and Left and Right Style-1 Brackets (H) (removed in Step 1) on the top Add-On Module. Attach only the two upper screws at this time.

6. Attach the Left and Right Style-2 Rack-Mount Brackets (I) to the remaining Modules and/or Master Unit. Make sure the two threaded holes on each bracket face up. Secure each bracket at the lower holes using the screws provided.

7. Place the Connecting Plates (J) over the Rack-Mount Brackets as shown in Figure 3.1. The Connecting Plates must be installed with the plate flanges facing out, and with two screw holes on the top edge and four screw holes on the bottom. Secure each Connecting Plate with four screws. Repeat this step to secure any remaining Modules.

D. Specifications

Coding: ASCII, Asynchronous

Baud Rate: 300 to 19.2K baud, Switch Selectable

Interface: RS232, 25-pin connectors

Lines Switched: 2,3,4 and 5. Pins 6 and 8 of all Input ports follow Pin 6 of the Control port.

Power: 90 VAC to 130 VAC (jumper-selectable),
   180 VAC to 260 VAC, 47 to 450 Hz.

Ambient Temp: 25°

Operating Temp: 0° C to 38°

Ventilation: 2" all sides

Size: 17.25" x 3.50" x 9.00" (W x H x D)

Weight: Master Unit: 7 lbs, Each Add-On Module: 4 lbs

E.   Customer Service

Customer Service hours are from 8:00 AM to 5:00 PM, PST, Monday through Friday. When calling, please be prepared to give the name and make of the unit, its serial number and a description of its symptoms. If the unit should need to be returned for factory repair it must be accompanied by a Return Authorization number from Customer Service.

WTI Customer Service
5 Sterling
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Phone: 949-586-9950
Toll Free: 1-800-854-7226
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F. FCC Statement

WARNING: This equipment generates, uses and can radiate radio frequency energy and if not installed and used in accordance with the instruction manual, may cause interference to radio and television reception. It has been tested and found to comply with the limits for a Class A computing device in accordance with specifications in Subpart J of Part 15 of FCC Rules, which are designed to provide reasonable protection against such interference when operated in a commercial environment. Operation of this equipment in a residential area may cause interference, in which case the user at his/her own expense will be required to take whatever measures may be required to correct the interference.

If this equipment does cause interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient the receiving antenna.
- Relocate the equipment with respect to the receiver.
- Move the equipment away from the receiver.
- Plug the equipment into a different outlet so that the equipment and receiver are on different branch outlets.
- Ensure that the mounting screws, attachment connector screws and ground wires are tightly secured.
- Ensure that good quality, shielded and grounded cables are used for data transmission.

You may find the following booklet prepared by the Federal Communications Commission helpful:

How to Identify and Resolve Radio-TV Interference Problems

This booklet is available from the US Government Printing Office, Washington, DC 20402, Stock No. 044-000-00345-4.

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